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The Oral Use of Diphtheria Toxoid in Immunization

1. EXPERIMENTS WITH GUINEA PIGS

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A NUMBER of reports (1, 2, 3) have cited the effective use of diphtheria toxoid administered orally as a recall dose, but there is no record of successful primary immunization with either toxins or toxoids by this route.

Bousfield (1) reported excellent results with oral diphtheria toxoid when given to previously immunized adults as a recall dose. In his studies, firm gelatine capsules, containing 100 Lf diphtheria toxoid, were used and their successful use was believed dependent on slow sucking. If swallowed, the capsules were apparently ineffective. He also reported failure in attempts to immunize Schick-positive individuals by this same treatment.

Petrini (2) confirmed Bousfield's work, using pills of the same strength (100 Lf per tablet). An excellent response as shown by rise of diphtheria antitoxin in the sera was noted for 26 adults tested. In these tests, the pills were swallowed immediately.

Masucci, Gold and DeFalco (3) also confirmed Bousfield's experiments. Substantial increases in antitoxin titre were noted in 19 adults and 3 children, following sucking of pills containing 100 Lf diphtheria toxoid. At the same time, attempts at the primary immunization of adults, by use of the same technique, appeared unsuccessful. However, with the latter group, it is possible 14 days was not enough time for antibodies to appear. Also it was noted that 0.01 units was the lowest unitage tested for, and this is 2.5 times the amount of antitoxin generally considered sufficient for diphtheria immunity. The possibility of lower levels of diphtheria antitoxin being present should not be ignored.

In the above experiments, there appears to have been little control over the

TABLE I

DIPHTHERIA ANTITOXIN TITRES RESULTING FROM

Total Dose Diphtheria Toxoid	Total number Lf.		Number of Guinea Pigs	Diphtheria				
				>131 <262.	> 66.0 <131.0	>33.0 <66.0	>16.0 <33.0	> 8.0 <16.0
4 c.c. (1 c.c. per day)	120	Pre-feeding titre	12					
		Post-feeding titre	12			2	2	3
8 c.c. (2 c.c. per day)	240	Pre-feeding titre	10					
		Post-feeding titre	10	1		5	1	1
16 c.c. (4 c.c. per day)	480	Pre-feeding titre	12*					
		Post-feeding titre	12		1	8	3	
32 c.c. (8 c.c. per day)	960	Pre-feeding titre	9					
		Post-feeding titre	9		2	3	1	
2.5 c.c. A.P.T. (0.5 c.c. 3 days) (1.0 c.c. 4th day)	125	Pre-feeding titre	14					
		Post-feeding titre	14		1	2	1	2
0.5 c.c. Subcutaneous	15	Pre-injection titre	8					
		Post-injection titre	8			2	2	2
32 c.c. (8 c.c. per day) Normal controls	960	Pre-feeding titre	12					
		Post-feeding titre	12					

*1 guinea pig had less than 0.004 units.

potency of the antigens in use. All three used tablets in which 100 Lf diphtheria toxoid was incorporated. Bousfield (1) in one experiment found that the manufacturing process completely destroyed the toxoid, but no mention was made of tests of potency for the other tablets. Petrini (2) made no mention of potency tests on his finished tablets. Masucci et al. (3) attempted without success to determine the Lf of the final product. They also performed an animal test in which 6 guinea pigs received 40 Lf of the diphtheria toxoid and were challenged 30 days later with 10 MLD of diphtheria toxin. All the animals survived and the authors concluded that the potency of the preparation had not been destroyed. This conclusion appears entirely gratuitous, for in the light of today's knowledge of bio-assays, a 6-animal test of this type would be considered little more than an identity test and would not permit of any quantitative estimation.

Notwithstanding the above criticisms, the excellent results obtained by the three widely separated groups were such as to merit further study. The following study relates to experiments on oral immunization using diphtheria toxoid as the antigen, and the guinea pig as the experimental animal.

Experimental Procedure

Toxoids Used

Two commercial toxoids were used in this experiment. The first was a fluid

TABLE I
ORAL AND PARENTERAL DOSES OF DIPHTHERIA TOXOID

Antitoxin Titres — Units										Average Titre Units
>4.0 <8.0	>2.0 <4.0	>1.0 <2.0	> .512 <1.0	> .256 <.512	> .128 <.256	> .064 <.128	> .032 <.064	> .016 <.032	> .008 <.016	
			1	4	6	1				.296
2	2				1					20.992
			1	1	5	2	1			.235
1	1									48.845
		1		1	1	3	3	1	1	.215
										47.104
			1	2	2	2		1	1	.260
1	1			1						40.661
			1	3	5	2	2	1		.228
4	1		3							19.694
					2	2		3	1	0.0825
1			1							22.368
										<.002
			1	6	3	2				.32

preparation containing 30 Lf per c.c. By guinea pig assay (4), at the time of this test, it was found to be 56 per cent as potent as the Laboratory of Hygiene's standard fluid toxoid. The second was an alum precipitated preparation containing 50 Lf per c.c. which was assayed at the same time as the fluid toxoid and was found to be 730 per cent as potent as the fluid standard.

Experimental Animals

White male guinea pigs 6 months of age and weighing 500±25 grams were used. With the exception of the controls, all of the guinea pigs had been immunized against diphtheria toxoid at the age of one month and all were Schick-negative at two months. The controls were normal guinea pigs that had not been immunized previously. They were of the same color, sex, age and weight as those above.

Immunization Procedure

Prior to oral immunization, approximately 5 c.c. of blood was taken from the heart of each animal. The sera were separated and titrated individually for diphtheria antitoxin. The dosages used, the number of animals and various other details of test, including the results, are given in Table I. The total dosages for the different groups were 4 c.c. (120 Lf), 8 c.c. (240 Lf), 16 c.c. (480 Lf) and

32 c.c. (960 Lf) of the fluid toxoid, and 2.5 (125 Lf) of alum precipitated toxoid. The doses were given orally by means of a pipette on four consecutive days. The normal guinea pigs received 32 c.c. (960 Lf) of fluid toxoid in the same manner. Further, 8 previously immunized guinea pigs were given 0.5 c.c. (15 Lf) of the fluid toxoid subcutaneously. The latter group was to serve as a control, and as a basis for comparison. Seven days after the final doses were given, the animals were again bled from the heart and the sera titrated for diphtheria antitoxin. The rabbit skin test (5) was used for all of the diphtheria antitoxin titrations.

Results

The results of the sera titrations may be seen in Table I. The average pre-oral immunization titres of the previously immunized guinea pigs was between 0.083 and 0.296 units of diphtheria antitoxin. The rise in antitoxin titre following oral doses of diphtheria toxoid was highly significant. The titres for individual sera ranged all the way from between 0.128 to 262 units, and average titres for the groups receiving 4 c.c., 8 c.c., 16 c.c. and 32 c.c. were 20.9, 48.5, 47.1 and 40.6 units of diphtheria antitoxin, respectively. The average titre for the group receiving the 2.5 c.c. of alum toxoid orally rose from 0.2 to 19.7 units, whereas the subcutaneous injection of 0.5 c.c. of fluid toxoid caused a rise from 0.08 to 22.3 units. Finally, the normal control guinea pigs whose pre-oral immunization titres were all less than 0.002 units, had an average titre of 0.32 units following the oral administration of 32 c.c. of fluid toxoid.

Discussion

Extremely encouraging results were obtained when varying amounts of fluid diphtheria toxoid were given orally to separate groups of previously immunized guinea pigs. One week after receipt of the toxoids, the diphtheria antitoxin titres rose from between 0.215 and 0.296 to between 20.992 and 48.845 units. The greatest response was found in the group that received 8 c.c. of toxoid. Increasing the dose to 16 and 32 c.c. did not result in higher antitoxin titres and, in fact, the average titres for the latter two groups were slightly lower. Alum precipitated toxoid given orally also caused a significant rise in titre. It was also found that primary immunization could be affected by the oral administration of diphtheria toxoid.

There do not appear to be any reports in the literature relating of experiences with oral immunization of guinea pigs with diphtheria toxoid. Reports dealing with attempts at primary and secondary immunization of humans, by the oral route, have been quoted (1, 2, 3). In each of these, encouraging results were obtained when the oral route was used for the recall dose, but failures were reported in the attempts at primary immunization by this same route. Criticism was levelled at these trials in that there seems to have been little control over the potency of the oral preparations at the time of use. Tablets of fairly high concentration (100 Lf) were used by all three workers. There is reason to believe that the potency of the toxoid may have been affected in the preparation of the tablet. Bousfield found that complete destruction of the toxoid occurred when the

toxoid discs were rapidly dipped in melted gelatine, but does not mention potency tests on other batches of similar tablets. Masucci et al., by guinea pig tests, found that the diphtheria toxoid in their tablets maintained its ability to immunize, but they did not determine its actual immunizing efficiency.

In the present study, with guinea pigs, the potency of the toxoids was determined and known at time of use. The preparations were used in their market form so that the chance of potency deterioration prior to its oral administration was minimal. The rise in titre that followed this administration was dramatic and encouraging. The development of diphtheria antitoxin in normal guinea pigs one week after oral immunization was not nearly so dramatic but was equally encouraging.

It may be of interest to note that, in this study, the toxoid was administered directly into the throat of each guinea pig so that the major effect is most likely to have come as a result of absorption through the oesophagus and through the gastro-intestinal membranes.

Several problems arise from this study. First—in the guinea pig—how long will immunity established by this route last?—and will it protect against parenteral challenge with diphtheria toxin? Second—in the human—when products of known and controlled potency are used, how effective will they be as the recall dose?—and will it be possible to bring about effective primary immunization by this route? These questions are being investigated and will be reported at a later date.

Recently completed repeat experiments have confirmed the results obtained for the primary immunization of guinea pigs by the oral route. Further, it has been shown that guinea pigs immunized in this manner were both Schick negative and were capable of resisting challenge doses of 15 MLD of diphtheria toxin 7 days after the final oral dose was given.

Summary

1. Striking rises in diphtheria antitoxin titre were obtained with different groups of Schick-negative guinea pigs, when oral doses of diphtheria toxoid were given as a booster or recall dose.

2. Encouraging antitoxin titres were obtained in a group of normal guinea pigs immunized by oral doses of diphtheria toxoid.

3. Guinea pigs immunized against diphtheria via the oral route were Schick negative and were able to resist a challenge dose of 15 MLD of diphtheria toxin 7 days after immunization.

4. Further studies on oral immunization with guinea pigs and with humans are now under way.

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Teaching the Social Aspects of Medicine

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ONE of the fundamental problems constantly facing medical schools in Canada and elsewhere is the capacity to change teaching content in terms of present and future discoveries in the science of medicine and in terms of the changing pattern of disease at any particular time. It is not enough that the medical schools simply adjust to trends that are forcing changes; they also must anticipate new developments and take leadership in exploiting them.

The problem of changing teaching content in terms of present and future developments is, of course, a problem that faces all departments in a medical school from anatomy to psychiatry. In some departments teaching content can remain relatively stable for a long period of time; in other departments teaching content has to be revised every year in order to embody new facts and concepts.

It should be no revelation to professors of preventive medicine that their field is in a state of flux. In fact, if there is a department of preventive medicine which gives evidence of stability in teaching content, it should be suspected of being unaware of changing concepts of public health and preventive medicine.

The Problem of Teaching Content

Reports on the Teaching of Preventive Medicine

The problem of teaching content in preventive medicine has received painstaking consideration from two committees, one in the United States and the other in Great Britain. Both committees were established by the associations representing the medical schools in the respective countries. Their reports, therefore, are worthy of serious consideration. The report in the United States was released by the Committee on the Teaching of Preventive Medicine and Public Health (1) in 1945. In Great Britain a parallel but more voluminous report was prepared by the Interdepartmental Committee on Medical Schools in 1944 and is better known as the Goodenough Report (2).

The two reports are similar enough in viewpoint and emphasis so that they can be considered together. They express concern with the prevailing concept of the medical student as a future junior health officer dabbling with techniques of

Part of a Symposium on the Teaching of Public Health and Preventive Medicine, presented at the seventh annual meeting of the Association of Canadian Medical Colleges, held in Quebec September 16 and 17, 1949.

public health practice. The current emphasis on sanitation is viewed very unfavourably not only because of its unrealistic approach to modern problems of preventive medicine, but more because the medical student has understandable difficulty in conceiving sanitary problems he reads and is told about and the medical problems he experiences personally on the medical and surgical wards of the teaching hospital as belonging within the same medical framework.

Both reports recommend that preventive medicine should concentrate on the broad general aspects of illness in which the family and community find themselves rather than on the individual as such. An attempt should be made to provide the students with a basic framework of factors that influence the health and disease of a population, which framework can be used as a working basis when he concentrates on the specific aspects of disease in the individual.

Given the new approach in the teaching content of preventive medicine, the two reports continue by recommending that the subject should be introduced in the preclinical years. Later, in the clinical years it is recommended that the student be given an opportunity to see at first hand the influence of general factors on the sick patient at bedside and home demonstrations.

The reports emphasize that the approach in the teaching content should be on the so-called social aspects of disease instead of the traditional content of current public health practice. The suggested approach of the two reports as outlined and interpreted in this paper appears logical and persuasive. They have clearly demonstrated that there is a problem of teaching content in preventive medicine, and have suggested general avenues of attack. But at precisely this important stage—the exact nature of the teaching content of preventive medicine and its transmission to medical students in terms both the teacher and the students understand—the reports end leaving the individual departments the problem of of interpreting the general statement in terms of detailed content and method. If we are to follow the recommendations of these reports, then our task is to work out a framework of preventive medicine which has concepts, techniques of research and application peculiar to its own field.

The two reports made one suggestion, however, which is specific enough to be interpreted easily and applied with profit. Both reports emphasized that the teacher of preventive medicine should carry a clinical appointment on the wards of the general hospital. This factor would serve to integrate the preventive medicine approach, which deals with the basic framework of disease patterns in a group, and clinical medicine, which deals with the individual patient and his illness.

This suggested transition in teaching content would appear to be logical when viewed in terms of the changing pattern of disease. The so-called preventable group of diseases have declined from a major to a relatively minor cause of morbidity and mortality as a result of public health measures and other factors. The medical student of today rarely sees cases of this type during his undergraduate course. The magnitude of this change is demonstrated by a statement of Gordon (3) to the effect that in the European Theatre of war during the Second World War more American soldiers died of alcoholism than of all the acute communicable diseases combined, including pneumonia and tuberculosis, and yet there is a tendency to concentrate on the communicable disease and

neglect alcoholism as a problem. To this one would add the well-known evidence of mortality (4) statistics which show clearly that the degenerative diseases, accidents and others have replaced the acute communicable diseases as the great killers.

Thus we should be considering in a course in preventive medicine not only the truly preventable diseases but all diseases that appear to be outstanding problems of today either on the basis of morbidity or mortality. The question is naturally raised as to our ability to make a worthwhile contribution in this larger field without overlapping present teaching in other subjects. We would feel that the mass statistical aspects of disease and their relationship to various social changes are more adequately covered by someone who has received public health training in the handling of information of disease on a group level than one primarily trained in the detailed consideration of the individual case.

Moreover, the responsibilities of the physician have changed. No longer can we reasonably expect a large proportion of the class to take an active part in public health administration by functioning as part-time health officers. Public health practice has rightfully joined the group of specialties and has become primarily a body of knowledge to be acquired after graduation from medicine. It is essential that the undergraduate should learn enough of the administrative framework of public health administration to appreciate adequately his position as a practitioner in the scheme of health control and to ensure his co-operation and appreciation of the importance of these agencies. However, there is no longer any justification for detailed instruction in this field, but rather it should be presented in a general and descriptive manner.

Recent Experience at the University of Western Ontario

The Department of Clinical Preventive Medicine at the Medical School of the University of Western Ontario was established in 1945 by Dr. G. E. Hall, who at that time was Dean of the Medical School and has since become President of the University. His actions leading to the conception and establishment of the department were greatly influenced by the Goodenough Report mentioned earlier.

Every effort was made to follow the recommendations of this report in the creation of the Department of Clinical Preventive Medicine. Four years have passed, and even a period of such relatively short duration offers a perspective in which to learn from our experiences.

In outlining our problems and tentative solutions there is, of course, no intention of criticizing the development and characteristics of courses in preventive medicine offered at other universities. Since this field is in a formative period, it is imperative that there be many and varied approaches to teaching content so that a cross-section of experiences can be drawn upon and fused into an approach which seems suitable to the purpose at hand. It is certainly premature to assert dogmatically that there is at present only one approach. Therefore, it is requested that what is to follow be accepted merely as the thinking and ideas of only one department.

While organizing and planning the department and the teaching content we attempted to modify the course so as to resolve as well as possible the difficulties that have been discussed in various studies dealing with preventive medicine.

At the same time it was necessary to prevent overlapping of the teaching in other subjects in the medical school so as to have a core subject which would serve a real need in the existing pattern of medical instruction. We were not happy with the findings of surveys of student opinions of medical education—that public health led the list with embryology as one of the subjects that should be "de-emphasized" (5). It was felt that the students' opinions were a result of the past and current emphasis on traditional problems of public health practice mentioned earlier.

The first problem to be met was the problem of integrating clinical and preventive medicine so that the students' minds would not be automatically compartmentalized when they stepped from a class in preventive medicine to the hospital wards and outpatient department or vice versa. Therefore, following the Goodenough Report, the department has not been organized as a separate entity, but as a subdepartment of the Department of Medicine. Thus the arbitrary and traditional split between curative and preventive medicine was overcome, at least on paper. From the beginning this arrangement has offered the advantage of making the hospital wards readily available for teaching purposes in preventive medicine and clinics have been held as part of the teaching program of the Department of Medicine.

At the University of Western Ontario there were two chief problems to be solved before we could embark on a good program in the teaching of preventive medicine. Problem one is still with us, namely bedside teaching. Clinical facilities for the teaching of preventive medicine are as yet to be exploited because we lack an adequate social service department in the hospital which could provide the necessary background material for instruction. The department cannot initiate such a development by itself but must await future action by the University and the teaching hospital.

Problem two was that the course in preventive medicine appeared to be introduced at too late a period in the undergraduate academic career. As was stated earlier, the teaching content in this subject must be of a general nature and introduced before the students are exposed to other subjects which have a specific and objective content.

Thus it was decided to introduce a general orientation course in the first year of medicine, and the major part of our time and effort has been directed towards molding the teaching content in this course. Although the course has been revised every year, we are still not entirely satisfied with it. We feel that we have gained invaluable experience and we would like to consider it in more detail in this paper.

During the past three years a block of 48 hours was reserved for the first-year course in preventive medicine. In the current school year we have planned to increase the number of class hours to 80. There were several reasons for selecting the first year for the orientation course. As a logical sequence in medical education, it was felt that a general orientation course in the first year should precede courses of specific content and application and provide a framework for them early in the medical training. Another reason for selecting the first year was that heretofore no course in preventive medicine had been offered to freshmen medical students. And lastly, it was possible to allocate a substantial block of hours to a course in preventive medicine.

As for teaching content in the first-year course, we have attempted to follow the recommendations of the Goodenough Report relating to the social aspects of disease on a broad and general basis. In our investigation of the literature on the subject purporting to deal with the social aspects of medicine, it soon became apparent that the term *social* was a very unsatisfactory one. It lacked a specific definition and content and everyone interpreted *social* in terms of his own biases and experiences. To some the term *social* was synonymous with hygiene and sanitation. To others it was the same as the emotionally loaded term socialized medicine. To still another group the word *social* was used to cover a heterogeneous mass of seemingly unrelated data and concepts which can best be described as a vague, idealistic yearning and groping for an answer to all man's problems. In fact, the latter concept of the word *social* appeared to be the general one.

At the University of Western Ontario we have chosen to teach what Ryle (6) describes as the health problems of families, groups, and large population aggregates. Explained further, we are concerned with changing patterns of disease, population composition and social and technical development in the Western world, and with the current picture of prominent diseases throughout the world. The approach might be called the ecology, social epidemiology, or biology of disease since the concept of all three terms has been broadened to mean essentially the same thing.

Stated in everyday language, we are concerned with the distribution and interrelationship of disease and population. The variations in the patterns of disease are related to the changing composition of the population. They are found to be excellent mirrors of other associated changes such as falling birth rates, rising standard of living, increasing educational opportunities, and so on, which have taken place during the same period.

The first-year course begins with description of the decline in the acute and certain chronic communicable diseases during the past 75 years as measured by mortality rates, and the influence the changing mortality picture has had on life expectancy. A picture of the various rates of decline in the more important diseases as measured by mortality is given, plus an analysis of variable rates in different types of areas at the present time. The relationship of the declining mortality rates to specific preventive measures is demonstrated where such exists, as in diphtheria in Ontario after 1930. Where no specific control measures have been present, the general pattern of decline and its association with other factors are indicated briefly, as in scarlet fever. Then the diseases that have risen in absolute or relative importance, e.g. cardio-vascular-renal diseases and poliomyelitis, are presented. Lastly, a general picture of diseases that are of historical interest to us such as cholera and typhus, but which are still to be found in some parts of the world, is given, with emphasis on the factors that appear to be associated with their rise and fall.

Then the broad pattern of change in medical organization that has accompanied changes in the disease picture is considered: the changes in medical education, rising costs of medical care, the use of the insurance principle in payment, present distribution and problems of adequate care, and so on.

The second part of the course is concerned with an analysis of the relevant social factors associated with different stages in the changing pattern of disease

and health control. This part of the course is under the direction of Dr. Odin W. Anderson, whose academic training has been primarily in the field of sociology and whose professional career has been one of concern with health problems. He was on the faculty of the School of Public Health of the University of Michigan for a number of years before he joined the Department of Clinical Preventive Medicine early in 1949. The part of the course under Dr. Anderson's direction represents an innovation and is in a formative stage. At this point it can be stated briefly, however, that we plan to teach in detail the measurement of changes in disease patterns using the population structure as the focal point.

Time and space do not allow a detailed description of the entire course. It is in a sense an extension of epidemiology beyond the usual meaning of the study of communicable diseases on a mass basis. The course is an extension in that it considers both communicable and non-communicable diseases and associates them with social changes. There is no attempt to determine cause-and-effect relationship because the general nature of our approach does not lend itself to such analysis. All that can be done is to show that the incidence of various diseases is only one part of the composite which includes the population composition, level of technical and social development, and level of medical development. By so doing it is hoped that the student will have a broad and general but still tangible framework within which he will be able to integrate specific preventive measures and techniques of medical practice taught later in his educational program.

Summary and Conclusions

In this short discussion we have attempted to outline our thoughts and difficulties in the establishment of teaching of the social aspects of disease with special emphasis on a general introductory course that is offered in the first year of the four-year medical course. This course has been modified extensively each year up to the present time and undoubtedly will continue to be changed as the years go by. How effective our approach has been is difficult for our own department to estimate. Certainly it has evoked marked student interest. Whether it will serve to influence their thinking in practice only the future will tell.

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Public Health and the General Practitioner in Rural Areas

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THE most effective method that I can follow to portray the work of public health and the general practitioner in rural areas is, I believe, to relate my experiences of the past seven years in the most eastern town in Nova Scotia, Canso. To the men who have been in general practice, this will be an incentive to reminisce. To those who have never been in private practice, this will be something different.

On a cold, foggy, drizzly day in June 1942, I sailed into the rock-bound harbour of Canso, on a little coastal ship. My sole equipment was contained in my little black bag, which was destined to be one of my important possessions. I was met by the local superintendent of the Commercial Cable Company, and taken to his home. During the course of the evening, he outlined the work of the practice and the territory. From his conversation, I gleaned that, in order to make any progress, it was necessary to treat the practice as a complete public-health project. My predecessor had been deceased three months and had been ailing for some time previous.

Late that evening I returned to my hotel room with somewhat mixed sentiments. The fact that I was seventy-eight miles from the nearest hospital did not tend to improve matters.

During my reverie, a knock came to my door. Upon opening it, I was faced by a Negro girl, with her hand shoved into her mouth and asking me to "haul a tooth". I was rather dismayed at this, my first case, as I did not have even a pair of forceps. Here were four thousand people, and no dentist nearer than seventy miles. I gave her some codeine and sent her off to a dentist the following morning.

I then retired, only to be awakened at 2.30 to go on a maternity case. The local taxi driver drove me to the place, and with considerable excitement I proceeded into the home of a typical fisherman. I was met at the door by a V.O.N. nurse, whom I was very pleased to see. Incidentally, Canso boasts the longest continuous service of the Victorian Order in Nova Scotia.

At the bedside of the patient, I was overwhelmed with misgivings about how any form of asepsis was to be maintained in such circumstances. The

Presented before the Public Health Administration Section at the thirty-seventh annual meeting of the Canadian Public Health Association, held in the Nova Scotian Hotel, Halifax, June 27-30, 1949.

case-room table of intern days had shrunken to a sagging bed approximately two feet high. The sterile instrument table was replaced by an old sea chest in the corner, covered with newspapers. The scrub-up sink had changed to an earthenware basin, and the water in it was brown, due to discolouration of swamp water seeping into an excuse for a well. Following the delivery of the baby, I returned home, vowing that this beginning, for the future generation of the district, must change—little realizing that a large number of the maternity cases that I would handle would be cared for in far worse circumstances.

After breakfast on this first morning, I was asked to go to a nearby community, where a child was very sick with diphtheria. I was driven to this little log cabin, surrounded by barren rocks. The cabin was dilapidated, and the mud that filled the chinks between the logs had fallen out in a number of places. I knocked on the door and, to my amazement, it was opened by a woman whose face was covered by a dirty white cloth with two holes cut in it for the eyes, one for the nose, and one for the mouth. There were two blotches of Creoline where the cheeks should be. This was her version of the surgical mask. She ushered me into the dingy cabin and proceeded to the door of a second room, which she untied and flung open. To my utter astonishment, there lay a little child four years of age. Apparently no attempt had been made to give him even the minimum of nursing care. The child lay uncovered in a filthy bunk containing faecal matter, and blood and mucous covered the pillow. I gave him antitoxin, but he died about an hour after I had seen him. This was the first of seventy-eight cases which I saw in the first weeks I was there.

In company with the public health nurse, we swabbed and inoculated for three weeks, day and night, until the epidemic died out.

Following the epidemic, we set out to obtain 100 per cent immunization for whooping cough and diphtheria in all the schools. Pre-school children were also invited. In three years we reached our objective. I now visit all nine school districts yearly to immunize the pre-school children and any in grade one who may not have been done, and I give all the pupils a reinforcing dose of 1/10 cc. every second year. This may not be quite according to prescribed procedure, but there has not been a case of diphtheria in the district in the past five years.

Vaccination clinics are held yearly, and it is a strict rule that no child is allowed in school without having been vaccinated.

Following the diphtheria epidemic, I began my work on pre- and post-natal care. I set down the rule that I would not deliver a case that had not had some pre-natal care. I made the concession that if the patient did not wish or was unable to pay for pre-natal care, she would never receive a bill for it. So I felt that it was not unfair to anyone. The rule has proved its value, because in five hundred cases I have not had a maternal death and there have been only three infant deaths—one a full-term case due to congenital abnormality and two prematures.

On June 23, 1943, I held my first well-baby clinic. This was in the form of a birthday celebration on the first anniversary of my practice in Canso.

These clinics have been held periodically ever since. The first one served as a major advertisement for pre-natal care, because the mothers themselves could see the difference between the babies that had received pre-natal calcium and those that had not. At the first clinics, a number of cases of rickets and scurvy were picked up. The Victorian Order nurses were taught to recognize the symptoms in their follow-up visits to the homes, and these conditions have practically disappeared. The clinics have improved the care of the babies at home, and more attention is being paid to weight and feeding. Instructive literature provided by drug and food companies, is handed out. Last year I saw the first group of children who had had pre-natal and post-natal supervision enter school, and I must say that they were a very healthy group of children and, on the average, a much healthier group than those entering school the previous year.

Then there was the bug-bear of all general practitioners, venereal disease. At first, I saw about three or four cases of gonorrhoea a week. It became very difficult to get the names of contacts, because some people were imbued with the axiom that it was not the manly thing to do to "squeal", as they expressed it. But the problem loosened up when some of the army personnel stationed at Canso, and for whom I acted as medical officer, became involved. Complete co-operation was obtained from them, and the situation was readily cleared up. I now see not more than two or three cases a year. Syphilis is relatively rare.

Throughout these years, I constantly kept before the people the necessity of a hospital. A number of citizens became enthused about the idea, and we set out on a venture which culminated in the most up-to-date small outpost hospital in Eastern Canada. The people of the district provided most of the money to prepare the building, which was rebuilt to conform to hospital standards; and the Canadian Red Cross Society equipped and staffed it and now operate it. On May 25, 1948, the first patient was admitted, and that night the first baby was born. It was the thrill of a lifetime to deliver a baby again in a modern case-room, fully equipped to handle any type of case.

The hospital has on its first floor an x-ray unit, which had been a necessity for a long time. It is being used in a concerted effort to ferret out tuberculosis in the district. We have picked up five new cases of tuberculosis during the winter and have done a large number of re-checks for the Divisional Medical Health Officer. Along with this, the unit is invaluable in the treatment of fractures, etc.

We have also a laboratory, where routine work is done, and a small dispensary. On this floor there also are a semi-private room and a dental parlour. We have obtained the part-time services of a dentist.

On the second floor we have our wards, nursery, operating room, and case room. The nursery is equipped with an incubator which has been invaluable in the number of babies it has saved.

But I will not bore you with too much detail concerning the project which I feel is the major public health achievement in this district, crippled as it has been by poverty during the depression, and retarded by its geographic location. Unfortunately, it adds a financial burden which will be a struggle to carry, but it will be maintained by the sacrifice of these people who have sacrificed to put it there.

Five years ago these people lost a very fine school. Since then, the children have been housed in very decrepit buildings. However, the people have been kept enlightened on the menace of these buildings, and they have begun the project of building a new $140,000 school. This should be completed in the next year.

This completes the story to date. The future presents two great problems, water supply and food surveys, with improvement of milk supplies and fresh foods.

The education of a large percentage of the people to accept these innovations has at times been rather discouraging, but now I can gratefully say that these same people are realising the truth of the old adage, "an ounce of prevention is worth a pound of cure."

To me the role of public health in my practice was the only solution to obtain a workable practice. The recompense was not financial, as most of the public health work was done free, but it was repaid one hundred fold in the healthy little faces of the boys and girls who held up their arms to be vaccinated before they trotted off to school last fall.

The Slaughter-House Problem and a Solution

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IN Canada, meats comprise approximately 10 per cent of the food intake and supply 24 per cent of the protein, 35 per cent of the fat, 24 per cent of the iron, and from 25 to 50 per cent of the B vitamins in the national dietary. Because of their origin and constitution, meats form a link in the chain of infections and infestations common to or requiring both human and lower animal hosts and should be the subject of particular sanitary precautions from the time of slaughter until served at the table. Public health legislation contains well-meaning sections dealing with the matter, but the ineffectiveness of present legislation may be gauged from reports pertaining to slaughter houses, meat-processing plants, and the sale of meats for human consumption. Official cognizance of the meat trade in the national economy has found expression for over forty years in the application of the Meat and Canned Foods Act, yet this Act, because of its limitations in scope, has been of greater significance to the export trade than to domestic food control. In Ontario, 18 plants operating under the Meat and Canned Foods Act are actively engaged in slaughtering. In contrast, over 1,600 slaughter houses are operating under authority of local boards of health. The degree of supervision given and the standards required are at the discretion of the local authority, which with few exceptions is unable to set up standards or give more than cursory attention. The following tables show total and comparative amounts of various classes of meats from Dominion-inspected and locally supervised plants and estimated condemnations in local abattoirs and slaughter houses, using the same condemnation rates.

The total per caput consumption of inspected meats in Ontario, approximately 93 pounds per annum, is subject to slight variation, depending on the amount brought in from other provinces. In general it is balanced by exports from Ontario to other provinces, chiefly Quebec and the Maritimes.

The information with respect to carcasses and portions condemned for food and rendered into tankage and inedible grease is clear in the case of inspected slaughterings. No information is available regarding the disposition of condemned carcasses or portions in locally supervised slaughter houses. Whether due to ignorance or a desire to protect the investment in livestock, there can be serious doubts that condemnations in local slaughter houses approximate those in plants operating under the Meat and Canned Foods Act. If, as may be charged, dispositions in inspected abattoirs do not measure up to present-day scientific fact and are the result of empirical thinking, the demands of foreign trade have necessitated maintenance of the standards employed. Aesthetic values and repug-

TABLE I

TOTAL NUMBER OF ANIMALS SLAUGHTERED, DRESSED WEIGHTS, AMOUNTS EXPORTED, AMOUNTS AVAILABLE FOR DOMESTIC CONSUMPTION AND PER CAPUT CONSUMPTION IN POUNDS, ONTARIO 1947

Class	Inspected Kill—Number of head	Total Dressed Weight (lbs.)	Exported from Canada (lbs.)	Available for Domestic Consumption (lbs.)	Ontario per caput consumption, inspected meat (lbs.)
Beef	349,320	169,770,000	11,700,000	158,070,000	39½
Veal	108,800	13,056,000	....	13,056,000	3¼
Lamb and mutton	230,300	11,515,000	1,160,000	10,355,000	2½
Pork	1,741,300	285,573,200	96,000,000	189,573,200	47½
Total	2,429,720	479,914,200	108,860,000	371,054,200	92¾

TABLE II

TOTAL PER CAPUT CONSUMPTION, INSPECTED MEATS CONSUMPTION IN POUNDS, AND PERCENTAGE INSPECTED CONSUMPTION BY CLASSES, ONTARIO 1944*

Class	Per caput Meat Consumption (lbs.)	Per caput Consumption of inspected meats (lbs.)	Percentages of consumption of inspected meats
Beef	70.4	39.5	56.1
Veal	11.2	3.2	28.5
Lamb and mutton	3.9	2.5	64.1
Pork	60.5	47.5	78.5
Total	146.0	92.7	63.5

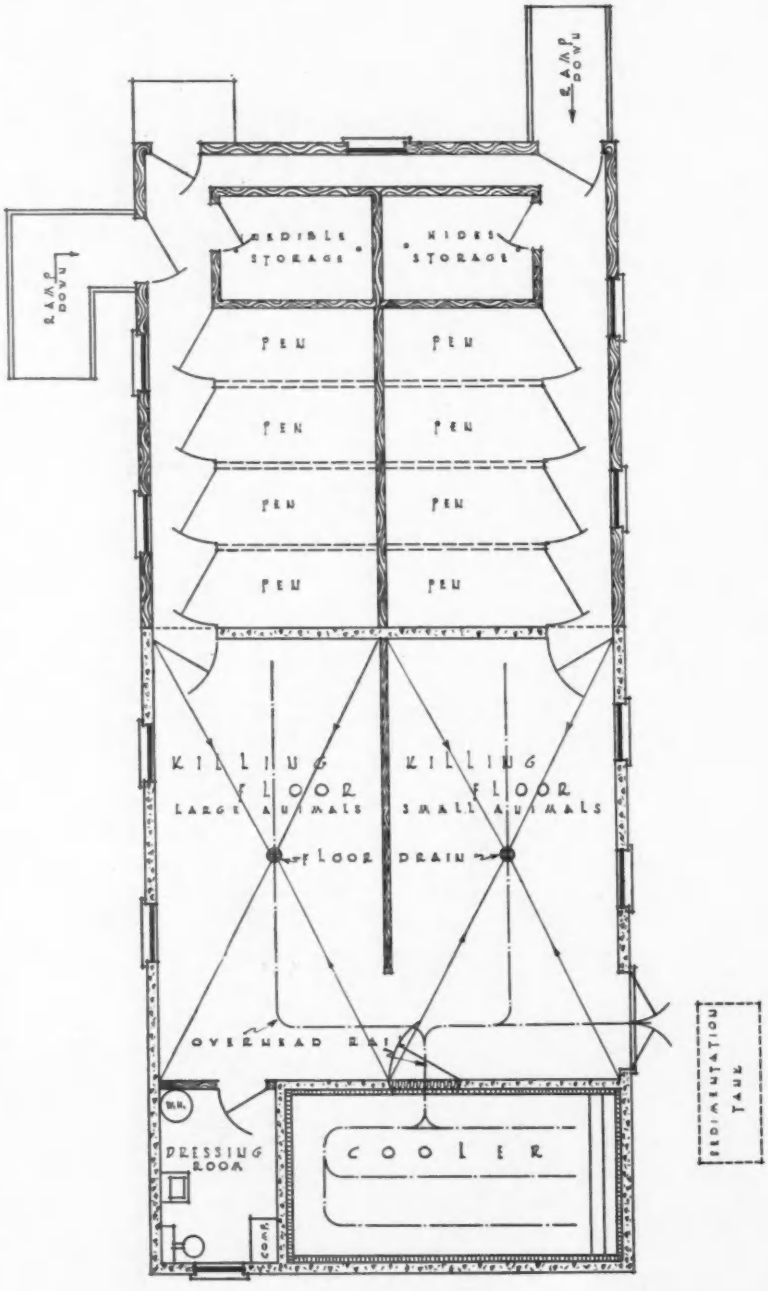
*Statistics supplied by the Dominion Government to the Combined Food Board, 1944.

TABLE III

ACTUAL INSPECTED SLAUGHTERINGS AND CONDEMNATIONS, TOGETHER WITH ESTIMATED UNINSPECTED SLAUGHTERINGS AND CONDEMNATIONS, USING INSPECTED CONDEMNATION RATES, ONTARIO 1947

Class	Inspected	Condemned Carcasses		Uninspected Kill	Estimated Carcasses unfit for food
		Number	Per cent		
Cattle	349,320	2,790	0.8	274,900	2,200
Calves	108,000	1,894	1.74	275,800	4,700
Sheep and lambs	230,300	991	0.43	129,000	555
Swine	1,741,300	4,878	0.28	477,000	1,335
Total	2,429,720	10,553	0.43	1,156,700	8,790

nance to knowingly eating the flesh of diseased animals can be considered no less in Ontario and other Canadian provinces than in those countries which receive our export meat products.



SLAUGHTER HOUSE

The problems presented by the small uninspected slaughter house are difficult to solve at the purely local level and call for an approach at a higher level designed to establish standards of construction, layout, facilities and sanitation of slaughter houses, together with the provisions of a code and of trained personnel. While the experience of Britain during war-time when the number of slaughter houses was reduced from 16,000 to 600, principally in the interests of efficiency and economy, could not easily be duplicated in Canada in peace-time, it is obvious that many of the present 1,600 slaughter houses in Ontario would not lend themselves to adaptation in conformity with any reasonable standard at an economical level. Efforts should therefore be made to stimulate the erection and operation of slaughter houses designed to serve the needs of several small operators within an area. The small town, village or country slaughter house is essential to the community and may be operated not only economically but in the interests of good sanitation and of ensuring clean, wholesome meat products for the rural and small urban dweller.

The interest shown and co-operation given by the various persons affected and concerned in one Ontario town of approximately 5,000 demonstrates a practical solution to the problems presented by small uninspected slaughter houses. Four slaughter houses owned and operated by local butchers supplied local needs apart from shipments from large abattoirs. The construction, condition and operation of these places may be duplicated in numerous municipalities and left much to be desired. Water supplies were absent, insufficient, or unsafe. Surface drainage and disposal of wastes created insanitary conditions. Lack of chill or hanging room did not enhance the quality of carcasses.

The determination of Board of Health members to provide clean and wholesome meat supplies for the municipality led to an analysis of the local situation, a frank discussion with the operators, and the setting up of a standard which had to be met if consent to operate as required under The Public Health Act were to be granted. The suggestion that the needs of the four operators could be met by providing an abattoir constructed and equipped to meet the desired standard was acted upon. A suitable site within the town limits was selected and town water and sewerage services were assured. Based on the volume of business of the operators and the estimated needs of the community, an abattoir was designed which was capable of handling from 50 to 75 cattle a week or larger numbers of other animals in these ratios: 1 cow — 4 hogs — 5 calves — 10 lambs. A cement-block building 40′ x 30′ and 18′ high was put up. This building has smooth-finished inside walls and is divided into two killing-floors each 30′ x 15′, one for cattle and the other for swine and small stock, a cooler 22′ x 10′ and a dressing room 10′ x 8′. The killing floors are divided by a partition which is solid except for a space of 6′ to permit the passage of dressed carcasses from the one floor to the cooler. The floors are cement and sloped to conveniently placed floor drains. The junctures of walls and floors are coved. The cooler is provided with mechanical refrigeration and is insulated with 4 inches of cork throughout. Rails on both killing floors and in the cooler are hung at 11′. In the cooler three rails are provided, running off a head rail and lengthwise 3′ apart and 2′ from the side walls. Switches are provided to allow for the placing of carcasses, and a drop rail extension is run from the small-stock killing-floor to a large sliding door,

where chilled carcasses are loaded. An adjoining building of frame construction houses livestock pens, hides and inedible storage. Four cattle holding pens and four small-stock holding pens are provided. Each opens to alleys leading respectively to the two killing floors. Livestock enter this section through a separate entrance and pass on to the killing room. The carcasses go into the cooler and the inedible material is removed to the room reserved for that purpose. Floors in the livestock section and in the section for inedible material are of cement and sloped for drainage. Chutes are provided for unloading livestock and there is a cemented area for loading inedible material, which at present is collected two or three times weekly. Liquid wastes pass through a sedimentation tank before entering the municipal sewerage system. A 2-inch water line permits the free use of water for all purposes and a small boiler provides ample hot water.

For the inspection, both ante-mortem and post-mortem, of animals and carcasses, a veterinarian has been employed on a part-time basis. Carcasses are stamped, and a degree of assurance is given that meats locally sold have been prepared under hygienic conditions. A portable hut serves as office accommodation for the veterinarian.

While the solution in this case to the inadequately equipped and poorly supervised small slaughter house may be far short of perfection, it may serve as a pattern for more widespread application.

Military Hygiene Problems Encountered in the Arctic and Subarctic

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THE military hygiene officer is concerned with maintaining the soldier in an optimum state of health so that he may be enabled to train or fight anywhere in the world. It follows that the military hygiene officer is interested in all aspects of the soldier's life which may affect his health. He is therefore concerned with military clothing, rations, shelter, water supply, sewage disposal and with any diseases or injury to which the soldier may be exposed. The environment for discussion is the Arctic and the Subarctic.

Perhaps it is permissible at this stage to consider briefly what is meant by the Arctic and the Subarctic. Ryan and Tedlie in an article in the Canadian Army Journal state that 83 per cent of Canada's land mass lies within the area which may be defined as Arctic or Subarctic. They define the Arctic as:

1. The area lying north of a boundary defined by a summer isotherm of 50°F. or 10°C. (An isotherm is a line joining points on the earth's surface having the same temperature at a given time, or the same mean temperature for a given period.)
2. The area lying north of a boundary defined by a winter isotherm of 14°F. or minus 10°C.
3. The area lying north of a boundary defined by the treeline.
4. The area lying north of the line formed by the windchill factor of 1400 in the coldest month. (Windchill is the cooling effect of combined wind and temperature measured in kilogram calories per square meter per hour.)
5. An area where it is cold enough long enough to be a detriment to human settlement.
6. An area of permafrost.

The subarctic is usually defined as the area where the mean temperature is higher than 50°F. for less than four months of the year and where the mean temperature of the coldest month is less than 32°F.

These same authors defined permafrost "as any ground, soil or bedrock, which has a temperature of 0°C. or lower all year round for a period of two or more years. Permafrost is of two types:

1. Wet permafrost, which is a mixture of ground and water.
2. Dry permafrost, which consists of bedrock or dry sand.

Tedlie and Ryan go on to state that Arctic regions are characterized by "long winters, low temperatures, long periods of darkness, high windchill factors, lack of humidity, low precipitation and permafrost."

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Let us now consider the problem of maintaining a soldier in an optimum state of health in this environment. The hygiene officer must be prepared to advise his commanding officer on methods of overcoming this environment. Ways and means must be found to enable the soldier to pursue his calling in extreme cold. In addition to providing suitable permanent quarters, the soldier must be equipped so that he is able to live, train and fight if necessary in the open in extreme cold. He must therefore be provided with special clothing which not only will keep him warm but which is so designed that he is able to operate his weapons and is able to attend to the calls of nature without too great a loss of heat. In order to remain fit in this environment he must be provided with a special diet which contains additional calories and is palatable. The soldier on operational duty must also be provided with shelter in order that he may sleep, cook his food and dry his clothing and equipment, and this brings up problems of sleeping bags, tents and stoves. Because of the cold and the permafrost, the provision of water and the disposal of waste are difficult problems. During the summer, ways and means must be devised of overcoming the hosts of insect pests and the muskeg. In all seasons of the year, disease and injury must be prevented as much as possible. The health of the native population must be studied and measures taken to prevent the serviceman's contracting their diseases.

Considerable research has been done and is in progress on the clothing of the soldier. Arctic clothing, in addition to keeping the soldier warm, must also be so designed that it does not interfere with the serviceman's using his weapons. It must also be so designed that the perspiration from the body can evaporate without saturating the clothing. Various suits of Arctic clothing have been designed and are being developed. In all these there are multiple layers of clothing with air spaces. The material used must be light and the bulk of the clothing must be reduced to a minimum. Consideration must be given to having clothing in which the needs of nature may be attended to in the open with a minimum loss of body heat. Hands and feet are special problems, particularly when the serviceman is required to stand for long periods; for example, the soldier on sentry duty. Soldiers with different tasks require different clothing: the infantryman and the tank soldier have different needs. The native of the Arctic, the Eskimo, has developed suitable clothing consisting of caribou skin and fur, the complete set of native clothing only weighing some nine pounds. However, it would not be practical to supply an army with Eskimo clothing, so that whilst good progress has been made, work to produce satisfactory military Arctic clothing continues. The Royal Canadian Mounted Police sum up the qualities necessary in the selection of Arctic clothing in five words: warm, light, loose, dry, simple.

Sleeping bags must be designed so that they keep the individual warm and yet are not too bulky. Decision must be made whether the soldier will remove part of his clothing when sleeping and if so, how much, and the bag designed accordingly. The principle of the bag is similar to that of the clothing; namely, to have layers with airspaces, and provision has to be made for the handling of the moisture produced during respiration. Mention may also be made of the need for a casualty bag for the evacuation of the sick and wounded. Again it may be said that satisfactory progress is being made in this problem and that work continues.

The soldier must be provided with heat and shelter. This may be done by means of double-walled tents heated by portable stoves. The danger of fire must be faced and, if possible, tents made of non-inflammable material. Heat is necessary to dry out clothing and for cooking purposes. Care must be taken that the fumes produced by the fuel do not produce harmful results such as carbon monoxide or lead poisoning. It must be remembered that above the treeline, all fuel has to be imported and carried by the force and thus the amount required must be the minimum for essential purposes. When possible, cooking should be done in a central place and the food sent to the men in suitable containers. Such a suitable place might be a wannegan; that is, a small house-like structure placed on commercial sleds and towed behind tractors.

As mentioned before, the soldier operating in the Arctic or Subarctic requires a different diet from the soldier serving in a temperate zone. This fact has been recognized and considerable work has been done. There is a satisfactory Arctic ration scale which contains a much higher number of calories than the scale used in the temperate zone. Special problems exist in the Arctic in providing the soldier with such commodities as fresh meat, vegetables and fruit. Soldiers operating away from their bases must be supplied with compact rations designed for small groups which can be prepared with portable camp stoves. It has been shown that the efficiency of the soldier decreases if he does not receive sufficient calories, so that these rations must, in addition to satisfying nutritional requirements, be palatable so that they will be completely eaten. Again, work continues, but it may be said that there is a satisfactory Arctic ration and that suitable compact rations are available although studies are in progress to make the ration more palatable and provide fresh meat, vegetables and fruit. In addition to satisfying nutritional requirements and being palatable, food must also satisfy sanitary requirements. Food infection and poisoning can occur in the north just as they occur in other parts of the world. The same sanitary rules apply but their enforcement is made more difficult by the shortage of water and the problem of obtaining heat.

The supplying of the military forces with water is the task of military engineers. The health officer is responsible for supervising the water supply and ensuring that it is fit for human consumption. In a few Arctic and Subarctic settlements, facilities exist to obtain water from lakes and rivers, to sterilize it and to distribute it by heated pipelines or by tank trucks. In smaller communities, water is obtained by melting snow and ice. In some places wells may be drilled but in most places the permafrost precludes this source of supply. For a military force moving in the winter, water must be obtained by melting snow and ice or from under the ice on rivers and lakes. These methods require fuel, which, as we have noted above, is in short supply. This water has to be checked for purity and sterilized if required.

The disposal of excreta and waste is another problem which in the Arctic and Subarctic becomes complicated. Major R. A. Smillie, Command Hygiene Officer, Prairie Command, spent a winter in the Arctic and investigated this and other military hygiene problems. On the individual act of evacuation he gives the following opinion. "Troops soon learn to evacuate in the open without shelter. The body loses a good deal of heat when exposed but none of it becomes really

cold except the hands, which are the main concern. One learns to expose oneself when one is warm and when one can get warm again soon after by stepping back in a warm tent or exercising. The process is made easier by the large sleeves of the Eskimo-style clothing which allows the hands and arms to be taken inside the clothing. One faces the wind and tucks the hands up inside the parka." Methods of disposal vary according to the size of the group, whether in a permanent or semi-permanent station or travelling. The Indians and Eskimos pay scant heed to sanitation and it is only in the larger white settlements that organized methods of disposal are used. In some places chemical toilets are used and there are a few communities in which there are flush toilet systems. When settlements are on the seashore, the waste products are dumped on the ice far enough out so that when the spring breakup occurs, they are carried out to sea. In other places the raw sewage is dumped on the ice of streams and lakes so that with the breakup in the spring the waste products are carried away but not without danger of contaminating the water and causing illness downstream. However, when troops are on the move, the above methods do not apply. The usual methods of digging slit-trench latrines for bivouacs and deep-trench latrines for longer stays are not practical where there is permafrost. One suggested method is the use of waterproofed paper bags or cartons. Major Smillie recommends that a drill be developed so that when a camp area has been fouled it will be marked so that other troops will not use this area. In some places it may be possible to use latrine tents or wannegans. Latrine tents cannot be used for other purposes as the frost from urine vapour forms over the inside and leaves a strong odour. In the final disposal of excreta, mention has already been made of placing it on the sea ice. Incineration is another method but requires fuel and therefore is costly and, in most instances, impractical. Sometimes it is possible to dig trenches in the summer for use in the winter, but this of course varies according to the amount of permafrost in the area concerned. In this connection, Major Smillie states: "The excreta can be shovelled out of the snow and taken to a dump. The wood or metal containers can be collected and dumped. The dump should be well away from possibility of contaminating water supply and should be placed so that, when it thaws, it will tend to lagoon before running into a stream. Therefore, unless there is sea ice or one is near the mouth of a river which no one down stream is likely to use for drinking water, one should not place sewage on the ice to be carried away in summer." It is thus apparent that sewage disposal in the Arctic and Subarctic is another problem awaiting solution.

Occupational hazards peculiar to cold climates are frost-bites, snow and fog blindness. Carbon monoxide is another hazard which must be considered because of the necessity for burning fuel in confined spaces. Carbon monoxide poisoning caused a few temporary casualties on the Muskox expedition because of operating in vehicles completely closed down.

The prevention of frost-bite is a matter of suitable clothing and training. Troops are trained that a soldier should not operate alone and they are trained to be alert for the first evidence of frost-bite in their companions. They are also instructed in the proper first-aid treatment of frost-bite; namely, by treating minor frost-bite of the face by simply placing the hand on the frozen spot, allowing the heat of the hand to thaw the tissue. They are taught that in more serious

cases the frozen part should be warmed very slowly and that under no circumstances should snow be rubbed on a frozen portion of the body.

Snow blindness is caused by the direct reflection of the sun's rays from the snow, and *fog blindness* is caused by the reflection of the sun's rays from fog particles. Both conditions are prevented by wearing good sun glasses.

The prevention of communicable diseases follows the usual lines. The hygiene officer should be aware of the diseases prevalent in the area of the Arctic or Subarctic in which he is operating in order that he may advise his commanding officer on measures to be taken to prevent disease. The high incidence of tuberculosis amongst Indians and Eskimos is well known, so that precautionary measures must be taken by the commanding officer to prevent the troops under their command contracting this disease. Troops would be warned of the poor sanitary habits of the native population and that only water and food from authorized sources were to be used. When troops are quartered in barracks, the same precautionary methods as are in use elsewhere must be employed for the prevention of respiratory diseases. Thus the health officer must insist that the soldier have adequate barrack space with proper ventilation and that such measures as the oiling of floors, if required, are carried out. Because of transport difficulties, it may at times be impossible to avoid overcrowding, but the hygiene officer should do his utmost to prevent this situation arising and the commander should be advised of the risk he is taking, particularly when troops are being brought into the Arctic from the more temperate parts of the country.

In the summer, the problem of cold is removed but this is replaced by another problem, insect pests. In the north, the warm weather is accompanied by the appearance of hordes of insects. Entomological studies have been made at Fort Churchill and other northern settlements. The problem at Fort Churchill has been complicated by the high velocity of the wind. At present these insect pests are combatted by means of insect repellents, by the use of suitable clothing, and by spraying areas with insecticides, depending upon the action indicated by entomological surveys.

An attempt has been made to discuss some of the military hygiene problems encountered in the Arctic and Subarctic. It is realized that the treatment of this subject has been cursory but it is hoped that it has been interesting and that it will stimulate interest in this phase of preventive medicine.

Bacteriophage Typing in the Province of Quebec

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IN a previous report (1) we gave the results of our typing of *S. typhosa* from September 1, 1941 to November 1, 1946. In the same report, we included the data secured by typing *S. schottmuelleri* from March 1, 1944 to November 1, 1946. We show here in Table I the results, complete for the year 1946, of typing *S. typhosa* (3,692 strains isolated from 1,867 persons). The purpose of the present paper is to review briefly our further progress in the field of bacteriophage typing in the Province of Quebec.

TABLE I
S. typhosa BACTERIOPHAGE TYPING
SEPTEMBER 1, 1941 TO JANUARY 1, 1947

Types	A	B_2	B_3	B_4	C	C_2	D_1	D_2	D_4	D_5
Cultures	296	230	2	1	846	1	211	64	23	37
Persons	153	105	1	1	437	1	70	53	9	20

Types	E	F	G	H	J	L	Gamma	W	Total
Cultures	957	321	1	10	9	17	563	103	3692
Persons	412	192	1	2	1	4	329	76	1867

Since January 1, 1947, we have examined 1,593 strains of *S. typhosa* isolated from 682 persons. In Tables II, III and IV are detailed the results obtained during the years 1947, 1948 and 1949, respectively.

TABLE II
S. typhosa BACTERIOPHAGE TYPING
IN 1947

Types	A	Aϕ	Aψ	B_1	B_2	B_3	C	D_1	E_1	E_4
Cultures	5	41	6	8	23	12	171	13	133	40
Persons	1	12	4	3	6	8	69	10	61	16

Types	F_1	F_2	N*	Gamma	W	Total
Cultures	34	7	43	15	8	559
Persons	19	2	11	6	5	233

*Old type D_3

Presented at the seventeenth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, held in the Royal York Hotel, Toronto, December 16-17, 1949.

TABLE III

S. typhosa BACTERIOPHAGE TYPING IN 1948

Types	A	Aϕ	Aψ	B_1	B_2	B_3	C	D_1	D_4
Cultures	3	11	9	16	54	10	81	9	2
Persons	2	3	3	8	13	5	36	4	2

Types	E_1	E_4	F_1	F_2	N	Gamma	W	Total
Cultures	136	76	37	14	27	12	8	505
Persons	52	36	18	4	5	8	3	202

TABLE IV

S. typhosa BACTERIOPHAGE TYPING IN 1949

Types	A	Aϕ	Aψ	B_1	B_2	B_3	C	D_1	E_1	E_4
Cultures	3	7	1	64	27	6	80	86	116	84
Persons	3	4	1	25	7	3	46	56	48	32

Types	F_1	N	Gamma	W	Not yet determined
Cultures	20	31	0	1	13
Persons	10	4	0	1	7

Total: 539 cultures
247 persons
Grand total from September 1, 1941 to January 1, 1950:
Number of cultures: 5295
Number of persons: 2549

The routine technique for typing is that as modified by Craigie and Felix (2). Continued incubation, as proposed by them, is used for all strains. Those which yield abnormal reactions or which are refractory to Phage II preparations are tested by the method of intermittent incubation on ordinary nutrient agar and also by continued incubation on nutrient agar containing 5 per cent glycerol. The glycerol greatly enlarges the diameter of the individual plaques (1, 2) and often permits typing of cultures giving poorly defined reactions by the usual method. Of course, the "critical test concentration" of the Phage II preparations must be determined for each of the methods employed. The phage preparations used at present are the following: I, III, IV, V, VI (these last two being new phages isolated in the Province of Quebec) and of II: A, B_1, B_2, B_3, C, C_2, D_1, D_2, D_4, D_5, D_6, E_1, E_2, E_3, E_4, F_1, F_2, G, H, J, K, L_1, L_2, M, N, O, T, a total of 32 preparations. These phages, except V, VI and E_4, derive from the strains of Craigie and Felix. In order to simplify the routine work, the cultures are tested first with the following preparations of the more frequently encountered types: I, III, IV, V, VI, A, B_1, B_2, C, E_1, E_4, F_2. This combination permits typing of more than 80 per cent of our cultures and only the remainder need be tested with all the preparations.

Tables II, III and IV show that nearly all our cultures of *S. typhosa* could be typed. Excepting those of W-form, only about 2 per cent of the cultures were refractory to our preparations of Phage II. It is noteworthy that, since the beginning of this year, we have not encountered a single refractory strain in the Province.

The sub-types Aϕ and Aψ which appear in these Tables are variants of Craigie's type A which were described in our previous report (1). These sub-types are of demonstrated epidemiological value.

The sub-type Aψ gives exactly the same lytic reactions as type A of Craigie, except that it is not lysed by phage I and phage E_4. All the cultures of this type which we have isolated in the Province of Quebec (92 cultures) contain a cryptic anti-O phage which is never lost by successive passages. This sub-type has a tendency to be transformed into the gamma form: that is, resistant to all preparations of phage II. This transformation has been demonstrated twice *in vivo*, in two different outbreaks where some members of the same family, ill about the same time, yielded strains that were clearly of type Aϕ whereas other members yielded strains entirely refractory to all preparations of phage II.

The sub-type Aϕ does not contain symbiotic phage and the only difference between this sub-type and type A of Craigie is that it is not lysed by phage III. In one patient, we have found that certain faeces specimens contained strains of Aψ only, whereas other faeces specimens from this person yielded only gamma-form strains.

We have been able to differentiate strains of these two sub-types from normal strains by individual use of phages I, III and IV (also V and VI), instead of using a mixture of phages I and IV. The agglutination tests with V and O sera do not serve, any better than the mixture of phages I and IV, to reveal the differences between these strains, which are slight but which nevertheless are important epidemiologically.

The sub-type C_2 is identical with the strain No. 361 isolated in the State of New York and examined by Miss Eina M. Clark of the Connaught Medical Research Laboratories, Toronto. By their lytic reactions, these two strains should be classified as a variant of type C. Only one strain of this type has been isolated in the Province of Quebec.

Type E_2 is a variant of type E_1; this has been demonstrated *in vitro*, but not *in vivo*. The original strain, isolated in 1945, was refractory to phages E_1 and E_2 and was lysed only by its homologous phage E_2. Within the past few years, however, it has acquired a certain affinity for phages E_1 and E_2 which indicates that it is being transformed into Type E_1.

Type E_4 also seems to be a variant of E_1. A woman carrier of type E_4 apparently contaminated raw milk consumed by another person, all the cultures from whom were of type E_1; and then, this person harbouring only type E_1, apparently infected, by contact, her sister, all the cultures from whom were of type E_4. Despite numerous attempts, we have not succeeded in effecting *in vitro* this transformation, which appears to be fairly well demonstrated *in vivo*. Moreover, we have been entirely unsuccessful in our attempts to propagate phage II of Craigie on any of the cultures of this type, numbering 234, which we have isolated. To differentiate this type, which is impossible with preparations of Phage II of Craigie and Felix, it was necessary to prepare a phage derived from a strain of Phage II isolated by us from a culture of type E_1. The original type II phage of Craigie was isolated from a type A culture.

Since 1943, we have isolated at least 49 different strains of Vi phages of *S. typhosa*: 7 strains of type I, 10 of type II, 6 of type III, none of type IV, 2 new strains of a type which we call type V, one new strain which we designate as type VI, and 23 strains the types of which have not yet been determined. These different phages were isolated from several culture types, especially types A, C, D_1, E_1, E_4 and F_1.

Type II phages, whether isolated from type A, type C, type E_1 or type F_1, do not react in the same manner. For example, types C, G, H and J produce few or no individual plaques with heterologous phages when the Phage II preparations are made from a strain isolated from a type E_1 culture.

The experience of all laboratories engaged in typing shows the difficulties encountered in differentiating types B_1, B_2 and B_3, as well as certain of the D types.

As a result of these experiences, one of us (J.-M. D.) has suggested to the Sub-Committee on Enteric Phage Typing of the American Public Health Association that a thorough study be made of other strains of type II phage, in order to search for another strain which might yield preparations, the reactions of which would be more specific than those of the preparations now generally employed by laboratories.

Since 1944 we have examined 520 cultures of *S. schottmuelleri*, isolated from 277 persons, by using the bacteriophages of Doctor Felix, of England. The results obtained are shown in Table V.

TABLE V

S. schottmuelleri BACTERIOPHAGE TYPING
MARCH 1, 1944 TO NOVEMBER 1, 1949

Types	1	2	3a	3aI	3b	Untypable Group Z
Cultures	41	0	295	35	46	103
Persons	21	0	168	19	27	42

Total: Number of cultures: 520
Number of persons: 277

It will be noticed that we have not yet isolated any strain of type 2 since we began our typing of this organism, and that the predominant type in the Province is type 3a, whereas that in England is type 1 (3).

For over a year we have been determining types of staphylococci with the aid of bacteriophages furnished by Doctor V. D. Allison, of London, England. This typing has proved very interesting, especially in the study of food poisoning. Only a small number of strains, however, have been examined.

SUMMARY

Since September 1, 1941, 5,295 cultures of *Salmonella typhosa* from specimens taken from 2,549 persons in the Province of Quebec have been examined by bacteriophage typing.

New sub-types which do not appear in the series of bacteriophages distributed by Doctors Craigie, Edwards and Felix have been identified. These sub-types are of demonstrated epidemiologic value.

Since 1943, at least 49 different strains of Vi phages of *S. typhosa* have been isolated. A study of other strains of type II phage is suggested in order to search for another strain which might yield preparations the reactions of which would be more specific than those of the preparations distributed at present throughout the world.

Since 1944, 520 cultures of S. *schottmuelleri* from 277 persons have been examined with the bacteriophages of Dr. A. Felix of England. All types but type 2 have been found in the Province of Quebec.

For more than a year, work has been done on phage typing of staphylococci, especially in food poisoning, with the bacteriophages furnished by Dr. V. D. Allison of London, England. No report is yet available.

ACKNOWLEDGMENTS

We express our gratitude to Mr. M. H. McCrady, Chief of Laboratories, for his encouragement throughout the work described and also for his aid in the preparation of this report.

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Canadian Journal of Public Health

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PUBLIC HEALTH — A SPECIALTY IN MEDICINE

IN 1948 the Royal College of Physicians and Surgeons of Canada added Public Health to the list of specialties which had been approved for certification. In the same year the American Medical Association approved the inclusion of Public Health as a specialty in medicine and established requirements to be administered by the Advisory Board for Medical Specialties. The inclusion of Public Health constituted one of the most important and far-reaching decisions that have been made in medicine. The fact that in both Canada and the United States, public health was one of the last fields to be added indicates that there were wide differences of opinion about its inclusion among the specialties of medicine. These differences arose fundamentally from the varying conceptions of public health and its administration. The public nature of the services rendered by medical officers of health, in contrast to the relationships in private practice, and the defining of the qualifications for the office of medical health officer and other personnel by governmental and other authorities, seemed to remove the necessity for certification as a specialist by the national medical societies. There was, however, a general recognition of the fact that public health constituted a specialty in the field of medicine.

The establishing of the Royal College of Physicians and Surgeons of Canada in 1929 followed a decade of effort on the part of those seeking the best interests both of the medical profession and the public. The lack had long been felt of some means of ascertaining the qualifications of those who practise special branches of the healing art. Special qualifications for Fellows were established, thus providing a distinctive designation. Year by year the Royal College has grown in stature and has fulfilled the high purpose for which it was founded. There have been granted the degrees of F.R.C.P.(C.) and F.R.C.S.(C.), and these degrees are accepted as equivalent to the highest degrees awarded in other countries.

The purpose of the Royal College, as stated, was to designate those who were qualified as specialists in various fields. The need for such a body in Canada was brought prominently before the public when steps were taken by the government in one of the provinces to designate those who were to be considered as specialists in the functioning of a provincial health insurance plan. As a result,

the Royal College undertook to establish certification of specialists in the whole field of medicine in Canada. This was indeed a very great undertaking. Specialty committees were appointed and the requirements for specialists in a number of the fields were established in 1936. The list of specialties did not, however, include public health.

The importance of the recognition of public health as a specialty was appreciated by the Executive Committee of the Canadian Public Health Association. In 1944, at the conference held in Toronto in November, a resolution was approved requesting that public health be included as one of the special fields for certification. This resolution was considered by the Executive Committee of the Council of the Royal College at several meetings and the request was not granted. Further representations were made and in 1946 the Council agreed to refer the subject again to the Committee for further consideration. Representatives of the Canadian Public Health Association presented the view of the Association to the Executive Committee of the College, and this was later followed by the acceptance of the recommendations. As a result, public health was included as a speciality. In accordance with the regulations of the Royal College, a specialty committee was appointed to prepare the requirements for certification in public health. Under the chairmanship of Dr. D. T. Fraser, this difficult undertaking was successfully completed and approved by the Council of the Royal College. In establishing specialties, provision for a Founders Group has been made. In this issue of the Journal will be found an announcement by the Royal College of the reception of applications for inclusion in this group as well as for the 1950 examinations.

In the United States, the American Medical Association established specialty boards. Following representations made by the American Public Health Association and by public health personnel of the Army, the Navy, and other agencies, a specialty board in public health was established in February 1949 under the title "the American Board of Preventive Medicine and Public Health, Incorporated." Provision was made for Canadian representation, and Dr. J. H. Baillie was named as the representative of the Canadian Public Health Association, representing the physicians engaged in public health in Canada. This most generous action of the Board was a further indication of the non-existence of the international boundary in medicine and public health.

Recognition of public health as a specialty in medicine, in both the United States and Canada, will become even more important as the years pass. Those who are graduating in medicine today have before them the whole field of medicine. They can prepare themselves to serve as specialists and meet the exacting requirements for such recognition. Public health can occupy its rightful position, and those who enter this field of service will be recognized by the profession as specialists. Equally important will be the increasing recognition of such specialists by provincial and local authorities. The provision of a Founders Group recognizes the equivalent value of years of experience and successful leadership of those who are serving as medical officers of health or rendering other important medical service in public health.

Public health will be able to make an even greater contribution on this continent through the recognition now given to it, and it will also be able to make an increasing contribution to the whole field of medicine and to the advancement of the medical profession.

NEWS

British Columbia

MR. A. C. MCKENZIE, a graduate of the University of British Columbia, has joined the staff of the Division of Health Education. Mr. McKenzie majored in zoology and psychology, and has done one year of post-graduate work in psychology.

FEBRUARY 1ST saw the establishment of yet another health unit with the opening of the Simon Fraser Health Unit with headquarters at New Westminster. This unit became possible as a result of the amalgamation of the local health services of Port Moody, Port Coquitlam, Fraser Mills, District of Coquitlam, New Westminster, District School Board No. 40 and No. 43 under a Union Board of Health. The director of the unit will be Dr. C. W. Wylde, former health officer for the City of New Westminster, while the senior nurse will be Miss Barbara Smith, who has had many years' experience in public health nursing throughout the province. The staff will consist of the former staff of the Ioco-Coquitlam-Port Moody Public Health District coupled with the New Westminster staff to include six public health nurses, two sanitary inspectors, and two clerks, in addition to the senior nurse and the unit director.

Alberta

THE EXTENSION department of the University of Alberta is planning to conduct a short course in hospital administration for matrons from small hospitals. Similar courses carried on throughout Canada during the war were found to fill a need. Alberta has ten schools of nursing and a school for nursing aides.

TO AID IN PROVIDING more persons trained in various aspects of public health, bursaries have been awarded to Misses Ruth McClure, Dorothy Guild, C. Ethel Shelene, M. Patricia Harley and Rita M. Ball. Misses McClure and Guild, who are on the staff of the Edmonton Rural Health Unit, took a short course in mental hygiene at the University of California earlier this year. Miss Shelene, senior serologist at the provincial laboratory in Edmonton, has just completed a refresher course in serologic techniques at the Laboratory of Hygiene, Ottawa; Miss Harley is enrolled in the public health nursing course at the Uniservity of Alberta; and Miss Ball took a short course in nursing management in Victoria, B.C.

Saskatchewan

J. M. HERSHEY, Ph.D., M.D., D.P.H., formerly of British Columbia, has assumed the positions of Assistant Deputy Minister of Public Health and Director of Regional Health Services in Saskatchewan. Dr. Hershey was formerly Hospital Insurance Commissioner for the British Columbia Department of Health and Welfare, in which capacity he organized and administered the B.C. Hospital Insurance Service. During his twelve years with the Department of Health and Welfare he occupied such other posts as director of various health units and Assistant Provincial Health Officer. Before obtaining his medical degree at the University of Toronto, Dr. Hershey also spent some time in research work on the standardization of Insulin.

THE DEPARTMENT OF PUBLIC HEALTH has established a new Administrative Services Branch which will coordinate certain administrative functions formerly handled by other divisions of the Department and the Health Services Planning Commission. Mr. George Townshend, formerly secretary of the Social Welfare Board, has been appointed director of the branch.

DR. F. BURNS ROTH, formerly of Winnipeg, was recently appointed Director of Hospital Administration and Standards in the Health Services Planning Commission. After receiving the M.D. degree from the University of Western Ontario, Dr. Roth practised medicine for 11 years at Whitehorse, Yukon, during which time he served as superintendent of the Whitehorse General Hospital. During the academic year 1948-49, Dr. Roth took the course in hospital administration at the University of Toronto. He then served as administrative resident in the Winnipeg General Hospital until his Saskatchewan appointment.

FIVE PHYSICIANS in the Department of Public Health and the Saskatchewan Cancer Commission have recently become certified specialists in various fields of medicine and public health. Dr. C. F. W. Hames, Regional Medical Health Officer of the North Battleford Health Region and Chairman of the Saskatchewan Cancer Commission, has received his certificate as one of the Founders' Group of the new American Board of Preventive Medicine and Public Health. Dr. Stanley C. Best, Director of the Division of Child Health, has been certified by the Royal College of Physicians and Surgeons of Canada as a specialist in pediatrics. Dr. John W. Bawden and Dr. Herbert F. McKenzie of the Allan Blair Memorial Cancer Clinic in Regina, and Dr. Charles C. Burkell of the Cancer Clinic in Saskatoon, have been certified by the Royal College as specialists in therapeutic radiology.

Manitoba

THE ORGANIZATION MEETING of the Manitoba Advisory Health Survey Committee was held on February 24 in Winnipeg. A committee of 24 members, representing various groups and organizations as well as professions in Manitoba, will conduct the survey under the Federal Health Grants. Chairman of the committee is Dr. Morley R. Elliott, director of Extension Health Services for the Department of Health and Public Welfare. Hon. Ivan Schultz, K.C., Minister of the Department, told committee members that specialists in the health field can do much of the investigating and reporting and the committee will make a final report with recommendations. Dr. Carl Buck of the University of Michigan and Mr. Graham L. Davis of the W. K. Kellogg Foundation are expected to re-examine public health in Manitoba and make new reports to bring their 1941 surveys up-to-date. There will be three sub-committees of eight members each to study general health and disease control, hospitals and hospitalization, and medical care.

DR. F. W. JACKSON, Director of Health Insurance Studies for the Federal Department of National Health and Welfare, spent three days in Winnipeg in March consulting with officials in the Department of Health and Public Welfare. The talks were in regard to the Manitoba health survey and a sickness survey proposed for this year.

DR. REBA WILLITS, Assistant Director of School Health Service for Vancouver's Metropolitan Health Committee, conferred early in February with Dr. P. L'Heureux of St. Boniface Health Unit on his work with the Wetzel Grid and with members of the Winnipeg Child Guidance Committee. She went on to Cleveland to observe their work on the Wetzel Grid.

DR. K. J. BACKMAN, Director of V.D. Control in Manitoba, attended the February conference in Vancouver of Directors of V.D. Control for the four western provinces. Miss A. Armstrong, public health nurse, also attended the conference.

DR. B. D. B. LAYTON, Director of V.D. Control for the federal Department of National Health and Welfare, visited Manitoba on his way back to Ottawa from Vancouver to meet with officials of the Manitoba Department of Health and Public Welfare and of the Manitoba Sanatorium Board.

DR. A. J. PHILLIPS, Director of the National Committee for School Health Research, sponsored by the Canadian Education Association and the Canadian Public Health Association, met with the Manitoba committee in February to receive their report. Members of the committee were: Dr. C. R. Donovan, Acting Deputy Minister of the Department of Health and Public Welfare; Dr. R. O. MacFarland, Deputy Minister of Education; Miss Grace Dolmadge, co-ordinator of the Winnipeg Child Guidance Clinic; Miss Isobel Robson, supervisor of home economics for Winnipeg Schools; Hart Devenney, director of physical fitness for the Department of Health and Public Welfare; Miss Margaret E. Nix, director of Health and Welfare Education; and Miss E. Russell, Director of the Public Health Nursing Division.

TWO RECREATION LEADERSHIP COURSES were held by the Physical Fitness Division March 6-10 at Clearwater and Manitou. Miss Irva Stewart conducted the school for about 25 students at Clearwater, and Mr. George Senyk taught the 40 students at Manitou.

HART DEVENNEY, Director of the Physical Fitness Division, was elected to the Board of Directors of the Winnipeg Y.M. C.A. at the annual meeting March 7.

A GROUP OF HALF-BREED WOMEN at Camperville have learned that living in a rather isolated community on a low-income does not restrict them to a diet of bannok, lard and potatoes. They requested provincial nutritionist Carolyn Midforth to instruct them in simple cooking and nutrition, and two groups of eight women each attended practical classes for five days. They were taught Canada's Food Rules and the why and wherefore of adequate menus. In class they cooked cereals, muffins, vegetables, fruit desserts, and milk dishes, using foods that were available in their outpost town, and they ate what they had prepared. Miss Midforth reported that attendance was 100 per cent and her pupils, ranging from 16 to 46 years, were prompt. They were anxious to try the new recipes at home on their own families and asked the nutritionist to return to give them more instruction.

MR. E. B. MORGAN, Assistant Director of Education in Hong Kong, spent almost a week in Manitoba during his six months' tour of Canada on a UNESCO Fellowship, awarded through the Canadian Reconstruction Council. He was particularly interested in adult education and visited the Bureau of Health and Welfare Education to study its materials and work.

Nova Scotia

THE PROVINCIAL DEPARTMENT OF PUBLIC HEALTH is planning to extend its maternal and child health services with a program of well-baby clinics. New equipment is to be bought with federal funds which will go to three clinics at New Road and Woodside in Halifax County, and Bear River in Annapolis County.

FUNDS HAVE BEEN earmarked for equipping the new chest clinic at the Halifax Tuberculosis Hospital, a teaching clinic for medical students from Dalhousie University. A bronchoscopist will be added to the staff of the Point Edward Hospital.

Newfoundland

FEDERAL GRANTS have been approved to buy additional equipment for and to increase the staff of the Hospital for Mental and Nervous Diseases, St. John's. X-ray equipment will be purchased which will be used for routine chest X-rays and other X-ray procedures not previously available in this department. Special operating room equipment will also be obtained to perform leucotomy operations.

Dr. Harvey Agnew to enter Consulting Field

DR. HARVEY AGNEW, executive secretary of the Canadian Hospital Council since its inception in 1931 and editor of "The Canadian Hospital", has resigned to enter the consulting field. Dr. Agnew has joined the hospital consulting firm of Neergaard and Craig, 41 East Forty-second Street, New York City, which will henceforth be known as Neergaard, Agnew and Craig.

Offices are being opened in Toronto and these will be under the direction of Dr. Agnew, who will continue as head of the course in hospital administration at the University of Toronto. Dr. Agnew will also continue on a part-time basis with the Canadian Hospital Council until next June.

Dr. Agnew organized the Department of Hospital Service of the Canadian Medical Association in 1928 and continued as secretary of that department and as associate secretary of the Canadian Medical Association until 1946, at which time the work of the Department of Hospital Service was in large measure taken over by the Canadian Hospital Council.

Dr. Agnew is a past president of the American Hospital Association and has served on a number of its Councils and committees. He was one of the first selections for honorary fellowship in the American College of Hospital Administrators and is a member of the American Association of Hospital Consultants.

Mr. Murray Ross, of Edmonton, has been named Assistant Secretary of the Canadian Hospital Council. Mr. Ross has been business manager and secretary-treasurer of the Royal Alexandra Hospital of Edmonton. He is a past president of the Associated Hospitals of Alberta, a trustee of the Alberta Blue Cross Plan, and a member of the American College of Hospital Administrators. Mr. Ross has had wide experience in executive work.

BOOKS

Tuberculosis. A Global Study in Social Pathology.

By John B. McDougall, C.B.E., M.D., F.R.C.P. (Edin.), F.R.F.P.S. (Glas.), F.R.S.E. Edinburgh, Scotland: E. & S. Livingstone Ltd., first edition, 1949. Toronto: Macmillan Company of Canada, Limited. 455 pages. $6.20.

DR. MCDOUGALL has tried to make this a "global study in social pathology." In spite of inherent difficulties he has succeeded to a high degree. He presents data of many countries (for what they are worth, many of them highly questionable) and to some extent guides the reader in an interpretation or evaluation of them. With less than one would desire of his own analysis and appraisal, he reviews much of the world's literature on tuberculosis of recent decades showing often conflicting evidence and viewpoints, but he is careful not to be too dogmatic in resolving such conflicts. He thus indicates refreshingly many problems without solving them.

One must be surprised at the charts, pages 159-161, demonstrating the trends of mortality in different countries. For the years 1936 to 1945 the interval given to one-year periods is the same as that given to five-year periods preceding 1936. This distorts the picture and gives an erroneous impression to the unwary reader. It is a wonder, too, that, in presenting the trends, and that implies comparison, proportional paper was not used instead of, or even in addition to, the arithmetic grid. Had it been, Dr. McDougall could not have avoided pausing to examine the near uniformity in the rates of decline in recorded tuberculosis mortality in one place in different periods or in many places in spite of vast differences in control programs. It is disappointing to find any "T.B. man" not facing this fact, and not attempting to find its explanation. It is particularly disappointing not to have Dr. McDougall's own critical analysis and comment.

This reader finds some conflicts in the book itself quite apart from the conflicting evidence on many phases of tuberculosis. For instance, it is abundantly evident in the comment, in the citations, and even between the lines that Dr. McDougall knows very well, perhaps none knows better, the value of intensive investigation of thoroughly sound though limited data, and he knows, too, the hazards and often the futility and waste of time in dealing with extensive data of questionable quality and comparability. Still, he devotes no less than twelve and one-half pages to reproducing a suggested schedule for recording the tuberculosis data of any community or country, presumably for a central analysis or comparison. Similarly, the hard common-sense apparent in the aside that in comparing, say, the east and west end of London, an accurate enumeration of the w.c.'s in each dwelling would be unnecessary stands in marked contrast to the plea he makes for the slavish standardization of forms and such like, even though he does allow for some elasticity in them—some adaptation to the circumstances. In reading these seeming incompatibilities one wonders whether the author stepped out of his own role of keen observer and critical analyst into the role of just another official in an organization which may be more intent on having things done than on first learning what to do.

There are a few slips of the pen or of the keyboard: "this data" and "data is", the only irritating ones. But these are understandable in view of the conditions under which the book was produced.

Carping criticism aside, Dr. McDougall has, as one would expect of him, built a mass of valuable material into a most readable and instructive form. The citations and extracts from a wide literature are well chosen. (Rich is quoted more often and more extensively than any other author.) With these and what there is of McDougall himself, the book is a very important one, and everyone interested in tuberculosis, both as a local and a world problem, should have it readily available to see what McDougall says.

The whole set-up and printing are up to the usual high standard of Livingstone books.

N. E. McKinnon

ABSTRACTS

About Alcoholism.

THE need for especially trained psychiatrists in the treatment of alcoholics is stressed in this article. Alcoholism today is America's unrecognized No. 1 emotional health illness. In the author's opinion, each alcoholic patient should be carefully examined and treated on an individual basis, the same as cancerous and tuberculous patients.

In discussing the origin of alcoholism, the author presents the alcoholic as a very sick person—sick in his thinking and behavior. With some, the alcoholism is a symptom of a major reaction type; with others it is symptomatic of "cancer of the ego" or ego weakness. Early recognition and proper treatment are of utmost importance. Individuals suffering from ego weakness lack, to a great extent, adequate development of the four essentials which result in purposive and efficient conduct and living: independence (self-government), freedom (to think and act at a mature level), power (to manage situations and take responsibilities), and prestige (assurance and feelings of adequacy).

Treatment is discussed from the medical psychological approach—enabling the individual "to develop inner peace so that he can live in the world, and in his world, without desiring or 'needing' the socially accepted and easily available narcotic provided by any sort of alcoholic beverage".

As long as his brain is still intact, the patient can be taught to understand what lies behind the alcoholism. In addition, he should be informed about his personality and alcohol problem. The author gives a detailed list of guides for daily use by means of which this can be effected. By thus controlling his habits of drinking, of thinking and of living, the individual is able to regain the enduring values of life.

Reference is made to the help which some alcoholics have received from religious groups, lay groups and lay-and-religious groups.

Robert V. Seliger, Indust. Med. & Surg., 1949, 18: 481.

Nutrition Course for Employees' Wives.

IN this article the author describes a nutrition program arranged by the C.T. Dearing Printing Company, Louisville, Kentucky. This was one of the projects for improving the health, morale and welfare of the workers, initiated by their medical department after its inception in January, 1948.

The first step in the program was a visit to the box-lunch company which provided lunches for the majority of the employees. Suggestions were made which would improve the mineral and vitamin content of the lunches. These were carried out.

Following this, a class in guidance to right food selection was organized for employees' wives. Plans were drawn up by a committee of department representatives working with the medical department and the nutritionist. A questionnaire was sent to the wives to find out their special interests. The medical department personnel and the director of the Central Dairy Council arranged the course. Representatives of the state and local Boards of Health, the State University and the local Red Cross participated in putting on the program. The topics discussed at the six sessions were: Menu Planning, Party Fare for the Family, Marketing Hints, Infant and Pre-School Health, Reducing and Gaining, and Suggestions for Reducing Food Costs. Arrangements for the care of small children were made in order that all mothers who wished could join the classes.

Keen interest was shown by the 100 employee-wives who attended. Enthusiasm was maintained and attendance excellent. Of the employees, 62 per cent were favorably impressed as evidenced by their comments on the improvement in their meals at home. Management felt that the improved nutrition of the worker no doubt was one of the factors which contributed to a reduction in accidents and absenteeism shown in the plant.

The project as a whole served to strengthen the employer-employee relationship. Furthermore it attracted attention in

the community and demonstrated the value of industry's use of community resources.

Cradie R. Rowntree, Indust. Med. & Surg., 1949, 18: 405.

Health Aspects of Air Pollution.

IN this paper the speaker pleads for a considered and intelligent viewpoint in the matter of atmospheric pollution. From an analysis of experience and data gathered over many years he presents facts relative to air pollution and its medical aspects.

The problem presented by air pollution in working places is contrasted with that of outside air pollution in communities. The modifying controls adopted by industry have contributed to steady progress being made towards solving its problem. Outside air pollution of communities dates back centuries before the industrial era. Wherever man goes or congregates he pollutes the air, first by breathing and second, by his habits and customs. Foreign particles arising from the surface of the earth, tobacco smoke, exhaust from motor cars, are some of the contaminants. Until recently movement of air has to a great extent rendered these exposures harmless, but modern conditions of industry and of living have augmented the problem and today it is feasible to consider deleterious substances in the general atmosphere as a possible cause of acute or chronic illness.

The problem of atmospheric pollution from the common industrial poisons, including such episodes as Donora, is discussed. Attention is drawn to the smoke hazard and the tendency to make it the occasion of injudicious statements. Reference is made to Dr. Louis I. Dublin's comments on a memorandum dealing with smoke pollution in New York City. The memorandum had been drawn up to substantiate the claim that smoke is a factor contributing to cancer of the lungs. In Dr. Dublin's opinion, statistics were misused for propaganda purposes and the data presented cannot be interpreted as indicating a close connection between atmospheric pollution and respiratory cancer. Reference is made also to the smoke problem as observed in Pittsburgh over a period of years and its relation to the incidence of pneumonia. Nothing tangible was found.

In conclusion, the speaker maintains that, except in very unusual and rare instances, pollution of the atmosphere by industrial fumes and gases does not occur to an extent to cause disability or death. From time to time it can cause serious annoyance to large groups of people. It may constitute a nuisance and even, at times, irritation and inflammation of eyes and upper respiratory system. Smoke pollution is a nuisance and can seriously interfere with general well-being and comfort, but in the light of available evidence it cannot be stated that it can cause specific disease or death to any considerable degree. Every resource of engineering science and practice should be employed to provide an atmosphere free from annoying or dangerous impurities.

A. J. Lanza. Presented at the 42nd annual conference of the Smoke Prevention Association of America, Birmingham, Alabama, May 24, 1949.

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